Biological Psychology

An Illustrated Survival Guide

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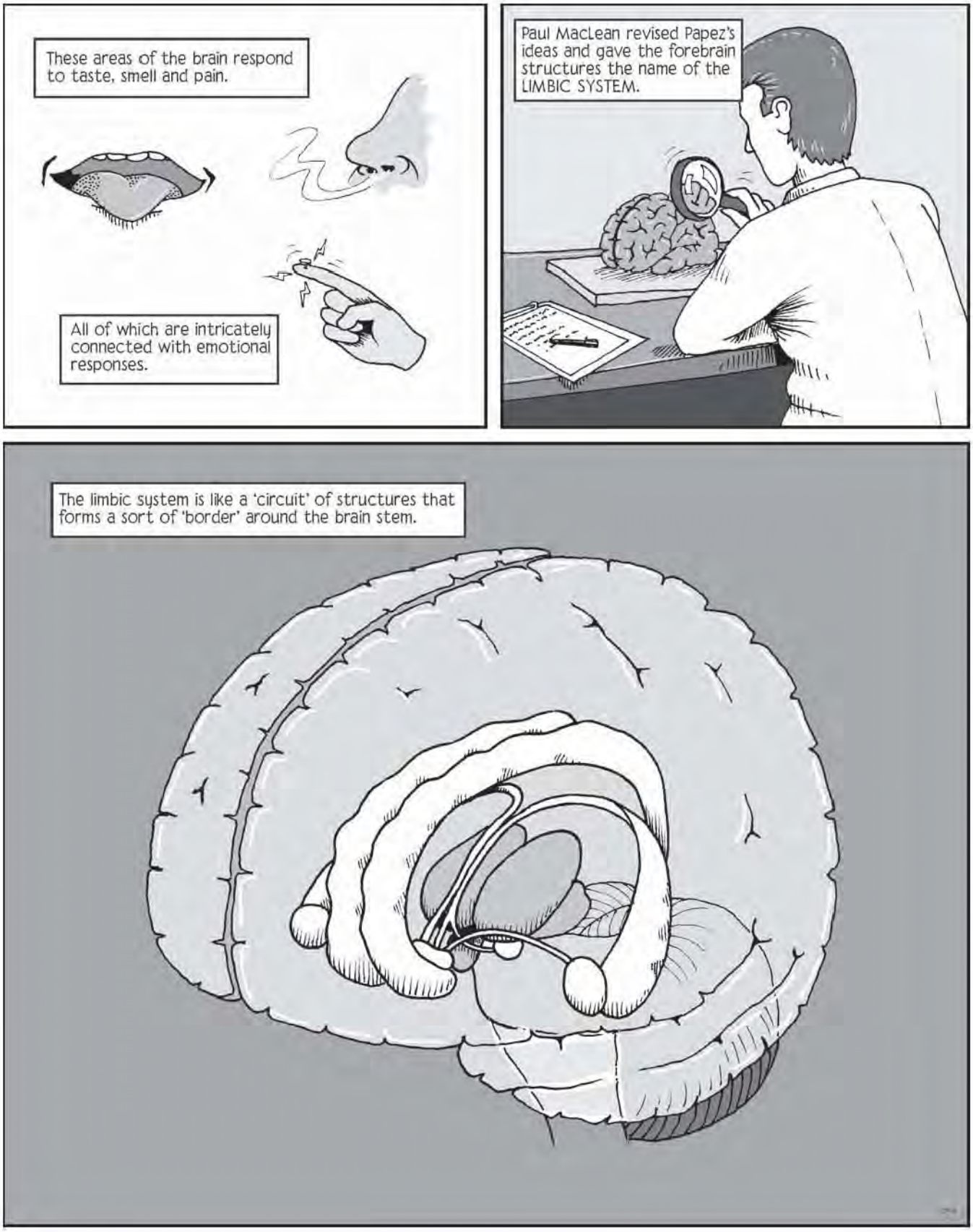
WILEY

CHAPTER 7
EMOTIONS AND SEXUAL BEHAVIOUR


Jasmine, kiss me!
Yeuuch!
That was exciting and emotional don't you think?
To humans, emotions and sexual behaviour are extremely important.
This chapter covers the biological underpinnings of both of these!
We can all recognise emotions in both ourselves and in others but in biological terms it is not quite so easy.
Bard was one of the first researchers to investigate the physiological and neurological bases of emotion.
Bard removed the cerebral cortex from cats and found that they displayed exaggerated aggressive behaviours and postures.
Bard concluded that SUB-CORTICAL structures were therefore responsible for the control of vigorous emotions like anger, but that it is the cortex that controls the appropriateness of these emotions in the correct contexts.
J. W. Papez suggested that emotional responses depend on a number of forebrain structures including the hippocampus, the amygdala, the olfactory bulb, and parts of the thalamus and cortex.
By the way, 'Papez' rhymes with 'grapes'!


These areas of the brain respond to taste, smell and pain.
All of which are intricately connected with emotional responses.
Paul MacLean revised Papez's ideas and gave the forebrain structures the name of the LIMBIC SYSTEM.
The limbic system is like a 'circuit' of structures that forms a sort of 'border' around the brain stem.

MacLean also noticed that the size of the limbic system varies little across mammals compared to the cerebral cortex.

This suggests that this area controls primitive functions that all mammals have in common.

Things like aggression, the avoidance of danger and sexual behaviour.

Later research clarified the role of the limbic system.

What is very clear is that an emotional experience involves several areas of the brain – not just the limbic system.

However, there is evidence that a full emotional experience tends to involve the left hemisphere of the cortex to a greater extent.

Emotions, however, are not just present in the Brain.

Emotions are often accompanied by physiological changes to the body.

These changes are known as AUTONOMIC AROUSAL and include an increase in heart rate, perspiration, blood pressure and so on.

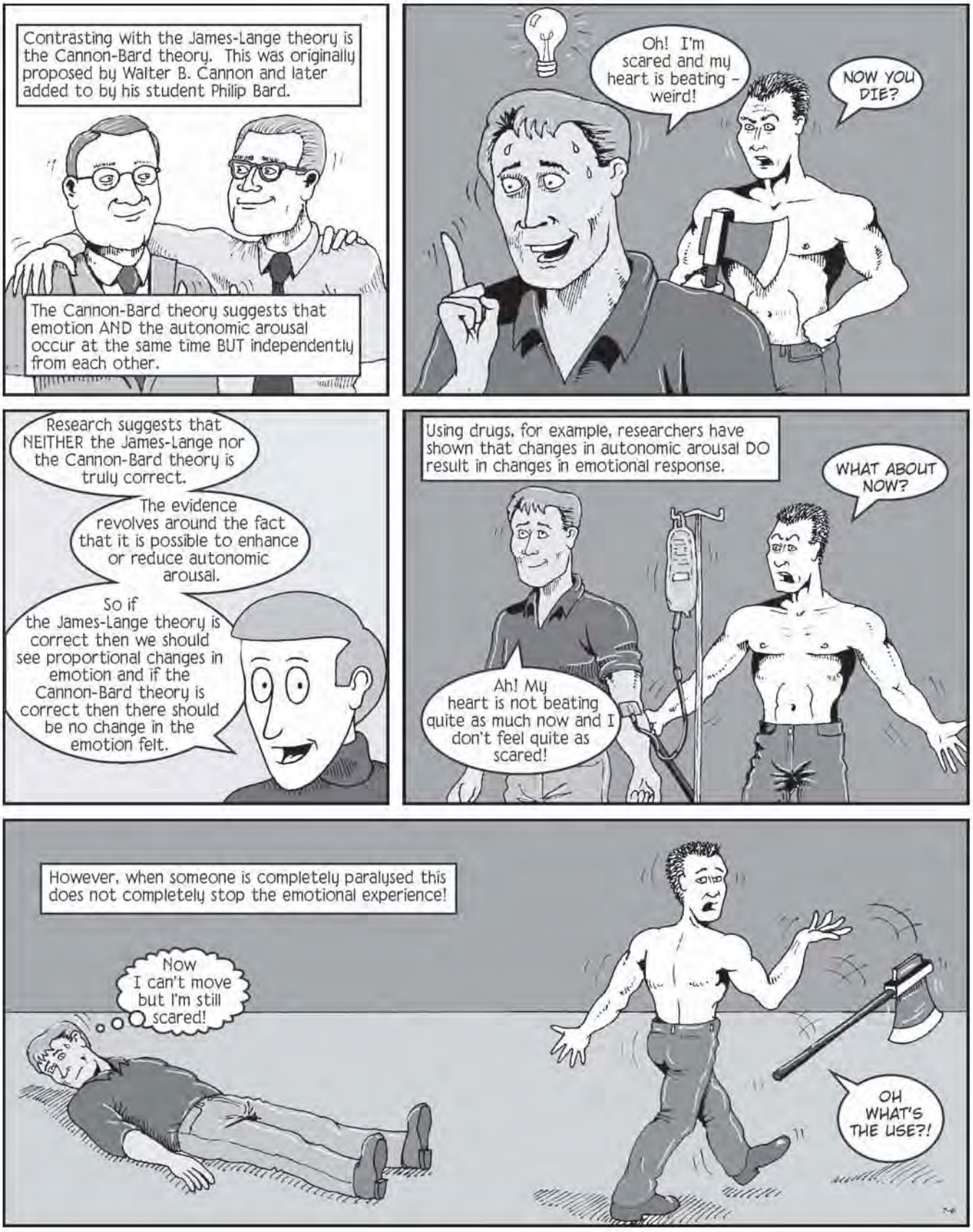
These changes are controlled by the sympathetic and parasympathetic nervous systems.

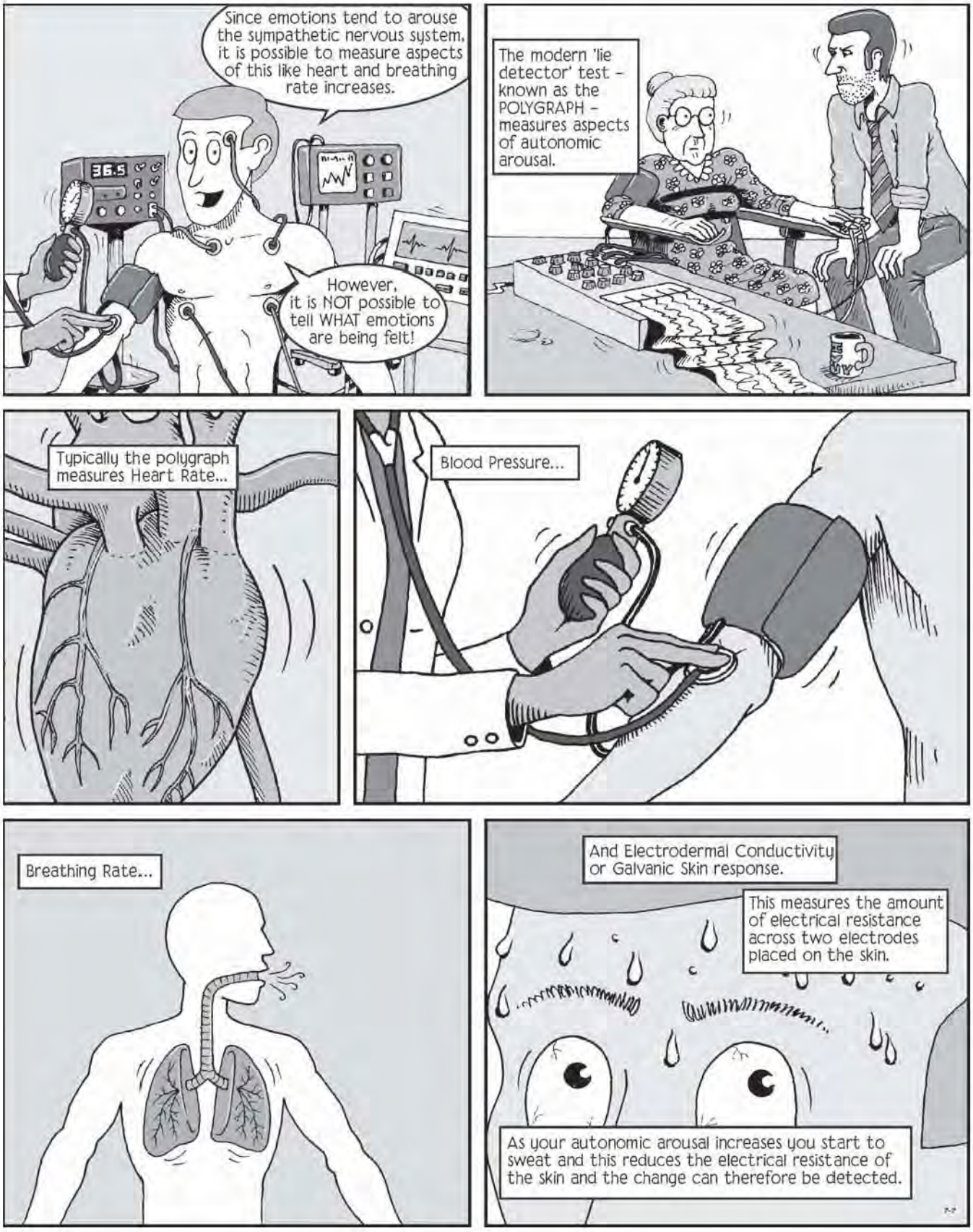
The sympathetic nervous system reacts to the environment and prepares the body for activity while the parasympathetic system slows the body down in the absence of any stimulation from the environment.

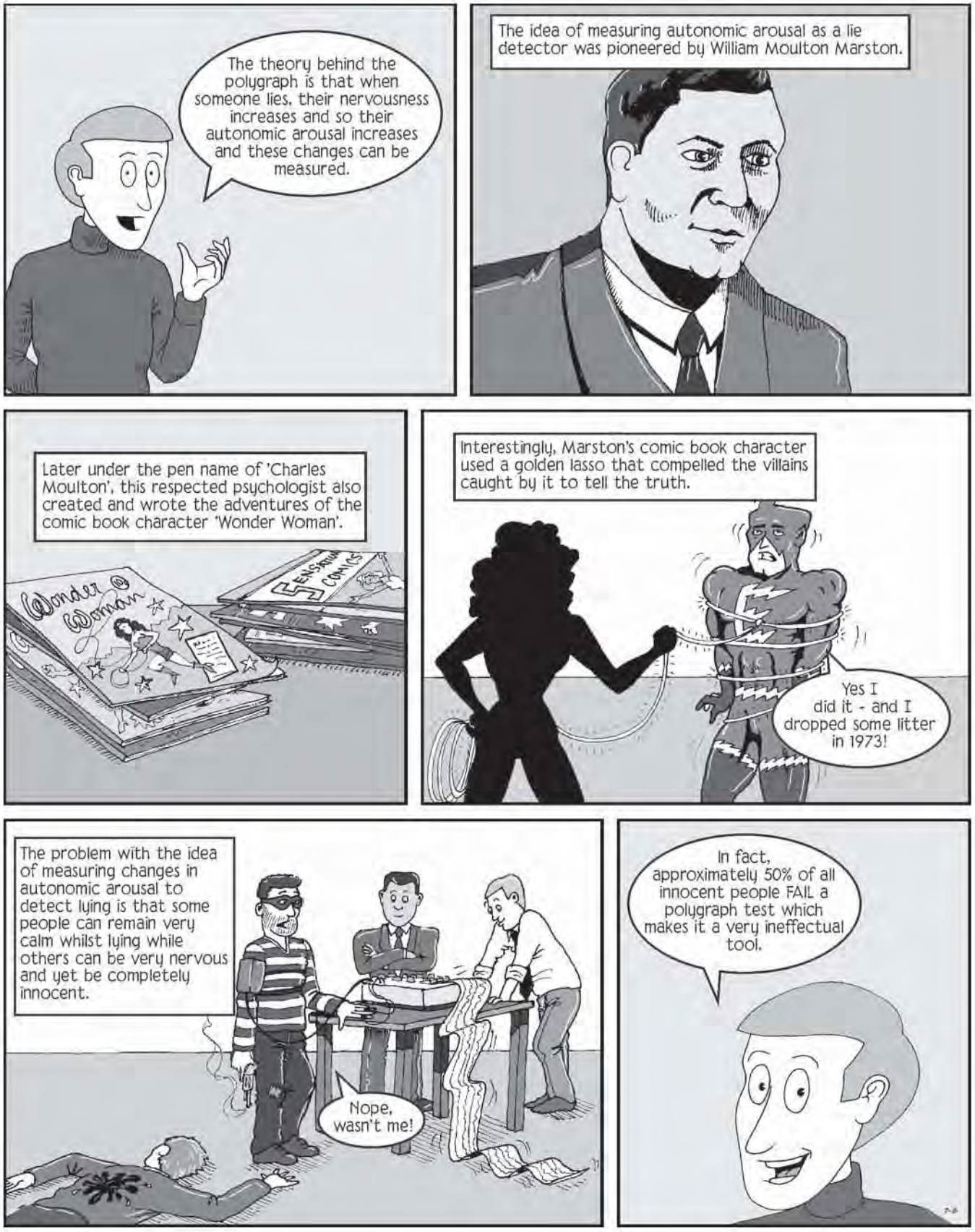
Neurons in the limbic system send their signals to the hindbrain structures – like the medulla and pons – which are then relayed to the spinal cord.

It is the spinal cord that controls the sympathetic nervous system.


The relationship between autonomic arousal and emotions is not really very clear.
Common sense would dictate that the emotion – in this case fear – comes first.
NOW YOU DIE!!
NO! NO!
Followed by the autonomic arousal.
In others words 'you are scared so you run away'.
However, William James – one of the first psychologists – suggested something different.
I WAS THERE 1ST
That the autonomic arousal comes before the emotion!
We THEN label that arousal with an emotion suitable to the situation.
NOW YOU DIE...
?
Oh! I must be scared!
In this case 'you are scared because you run away'.
Actually this theory was independently suggested at about the same time by Dutch psychologist Carl Lange.
So it is known as the James-Lange theory of emotion.

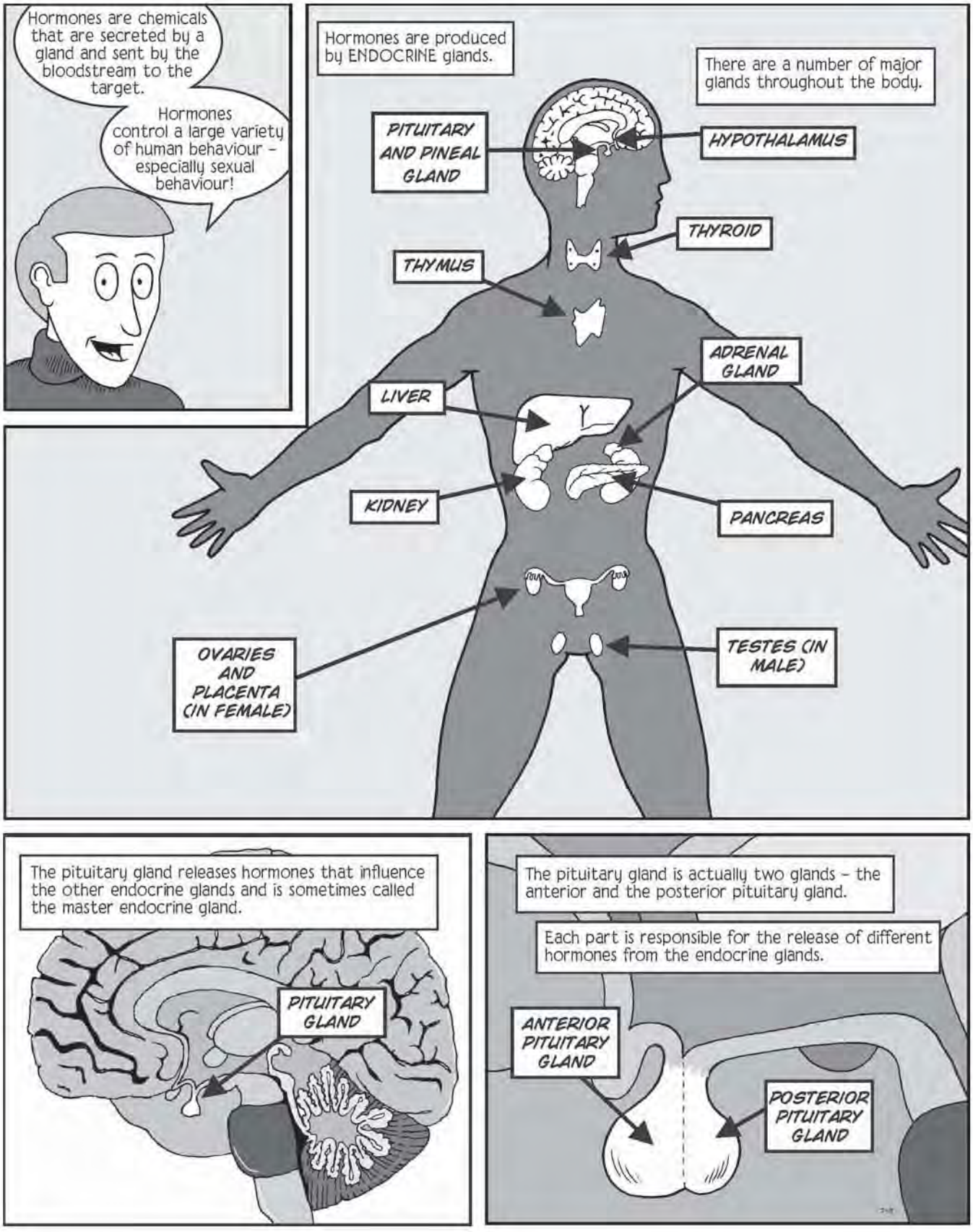

Contrasting with the James-Lange theory is the Cannon-Bard theory. This was originally proposed by Walter B. Cannon and later added to by his student Philip Bard.
The Cannon-Bard theory suggests that emotion AND the autonomic arousal occur at the same time BUT independently from each other.
Oh! I'm scared and my heart is beating - weird!
NOW YOU DIE?
Research suggests that NEITHER the James-Lange nor the Cannon-Bard theory is truly correct.
The evidence revolves around the fact that it is possible to enhance or reduce autonomic arousal.
So if the James-Lange theory is correct then we should see proportional changes in emotion and if the Cannon-Bard theory is correct then there should be no change in the emotion felt.
Using drugs, for example, researchers have shown that changes in autonomic arousal DO result in changes in emotional response.
WHAT ABOUT NOW?
Ah! My heart is not beating quite as much now and I don't feel quite as scared!
However, when someone is completely paralysed this does not completely stop the emotional experience!
Now I can't move but I'm still scared!
OH WHAT'S THE USE?!

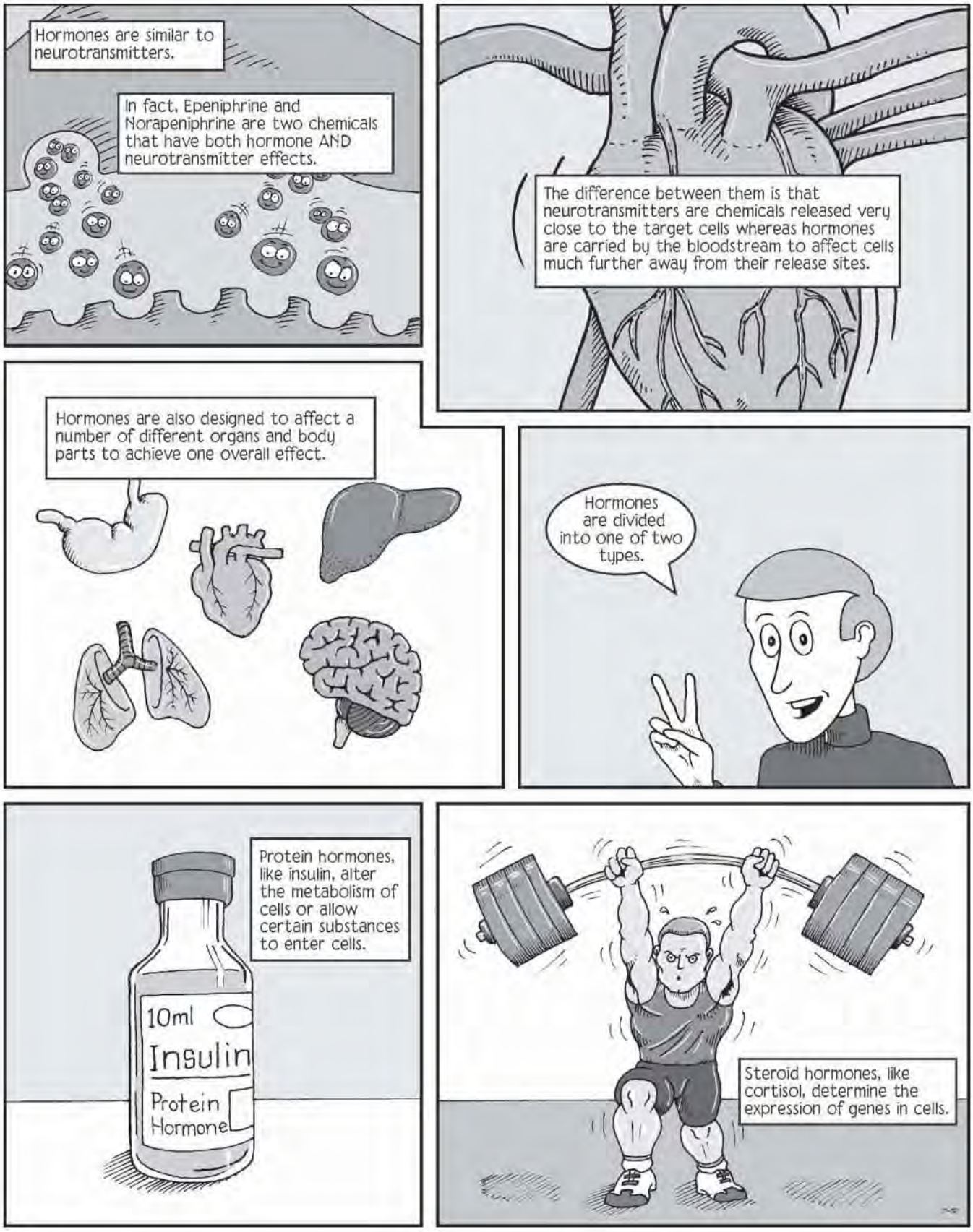

Since emotions tend to arouse the sympathetic nervous system, it is possible to measure aspects of this like heart and breathing rate increases.
However, it is NOT possible to tell WHAT emotions are being felt!
The modern 'lie detector' test – known as the POLYGRAPH – measures aspects of autonomic arousal.
Typically the polygraph measures Heart Rate...
Blood Pressure...
Breathing Rate...
And Electrodermal Conductivity or Galvanic Skin response.
This measures the amount of electrical resistance across two electrodes placed on the skin.
As your autonomic arousal increases you start to sweat and this reduces the electrical resistance of the skin and the change can therefore be detected.

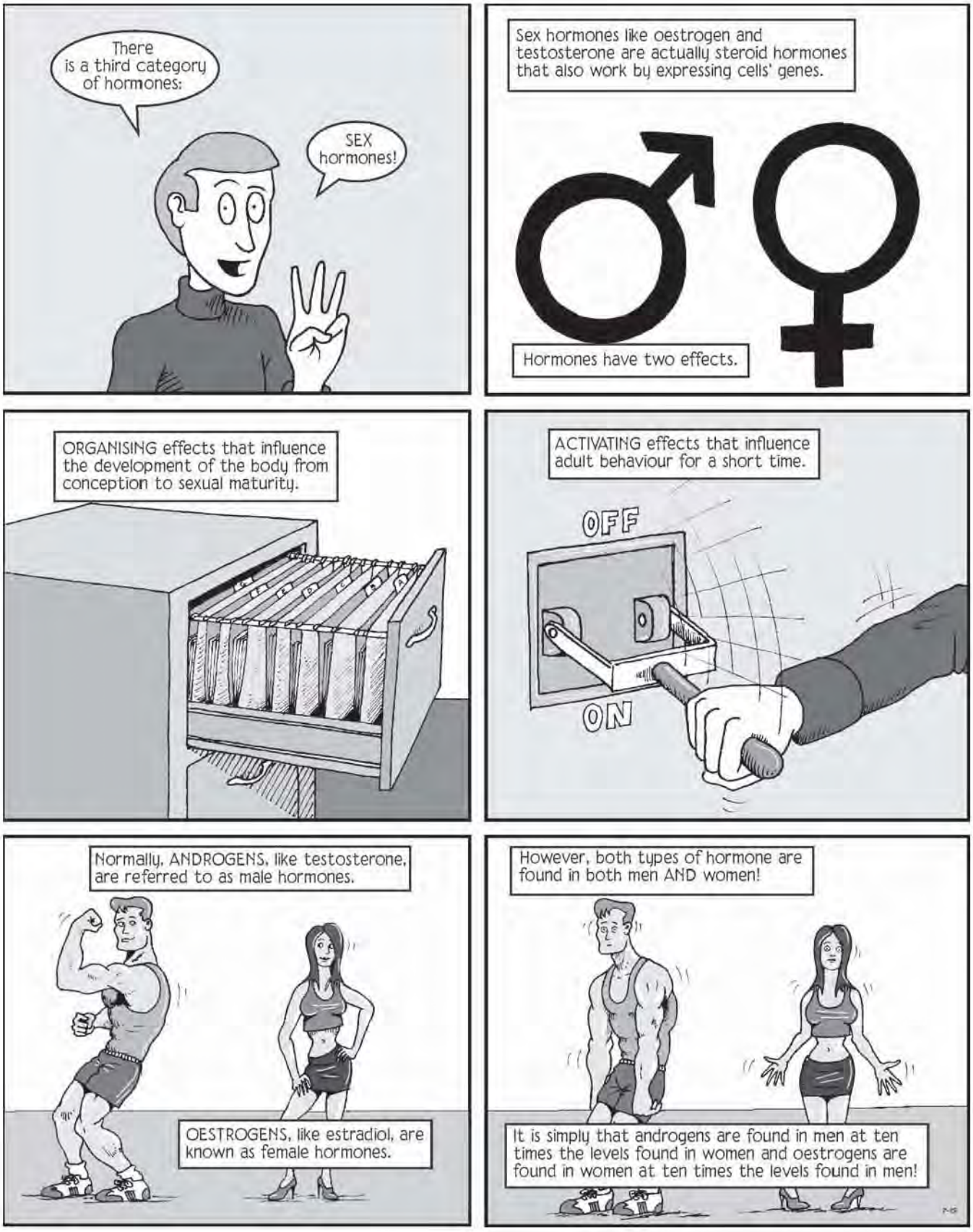

The theory behind the polygraph is that when someone lies, their nervousness increases and so their autonomic arousal increases and these changes can be measured.
The idea of measuring autonomic arousal as a lie detector was pioneered by William Moulton Marston.
Later under the pen name of 'Charles Moulton', this respected psychologist also created and wrote the adventures of the comic book character 'Wonder Woman'.
Wonder Woman
Sensation Comics
Interestingly, Marston's comic book character used a golden lasso that compelled the villains caught by it to tell the truth.
Yes I did it - and I dropped some litter in 1973!
The problem with the idea of measuring changes in autonomic arousal to detect lying is that some people can remain very calm whilst lying while others can be very nervous and yet be completely innocent.
Nope, wasn't me!
In fact, approximately 50% of all innocent people FAIL a polygraph test which makes it a very ineffectual tool.

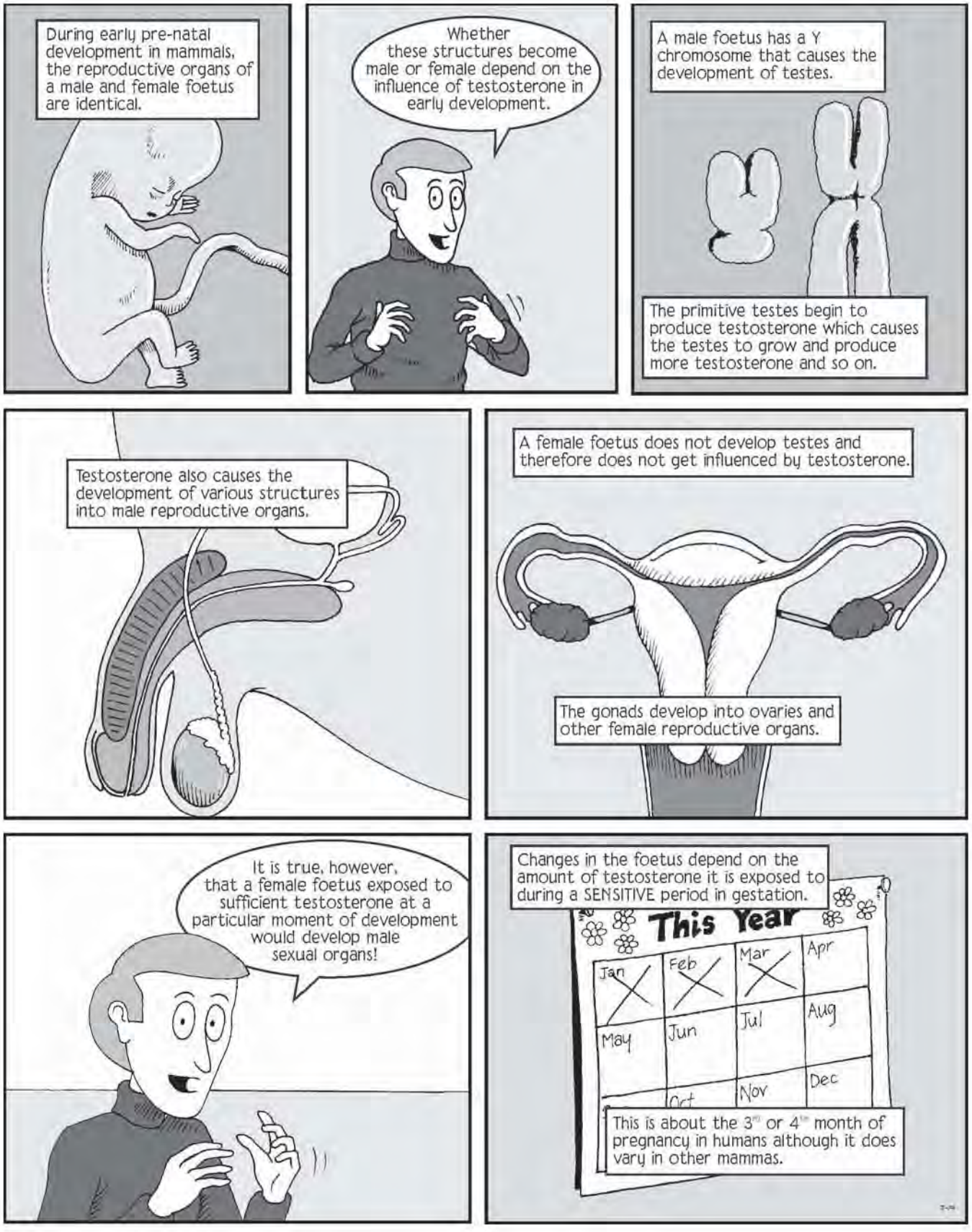

All of this last section has looked at emotion as a response to a certain situation and how they are accompanied by certain physiological factors.
However, both humans and mammals communicate their emotions to others in order to fulfil various social functions.
Charles Darwin suggested that human facial expressions of emotion were likely to have a biological origin.
Later research using isolated tribal communities showed that there are at least four basic universally recognised human expressions.
Happiness.
Sadness.
Anger.
and Disgust.

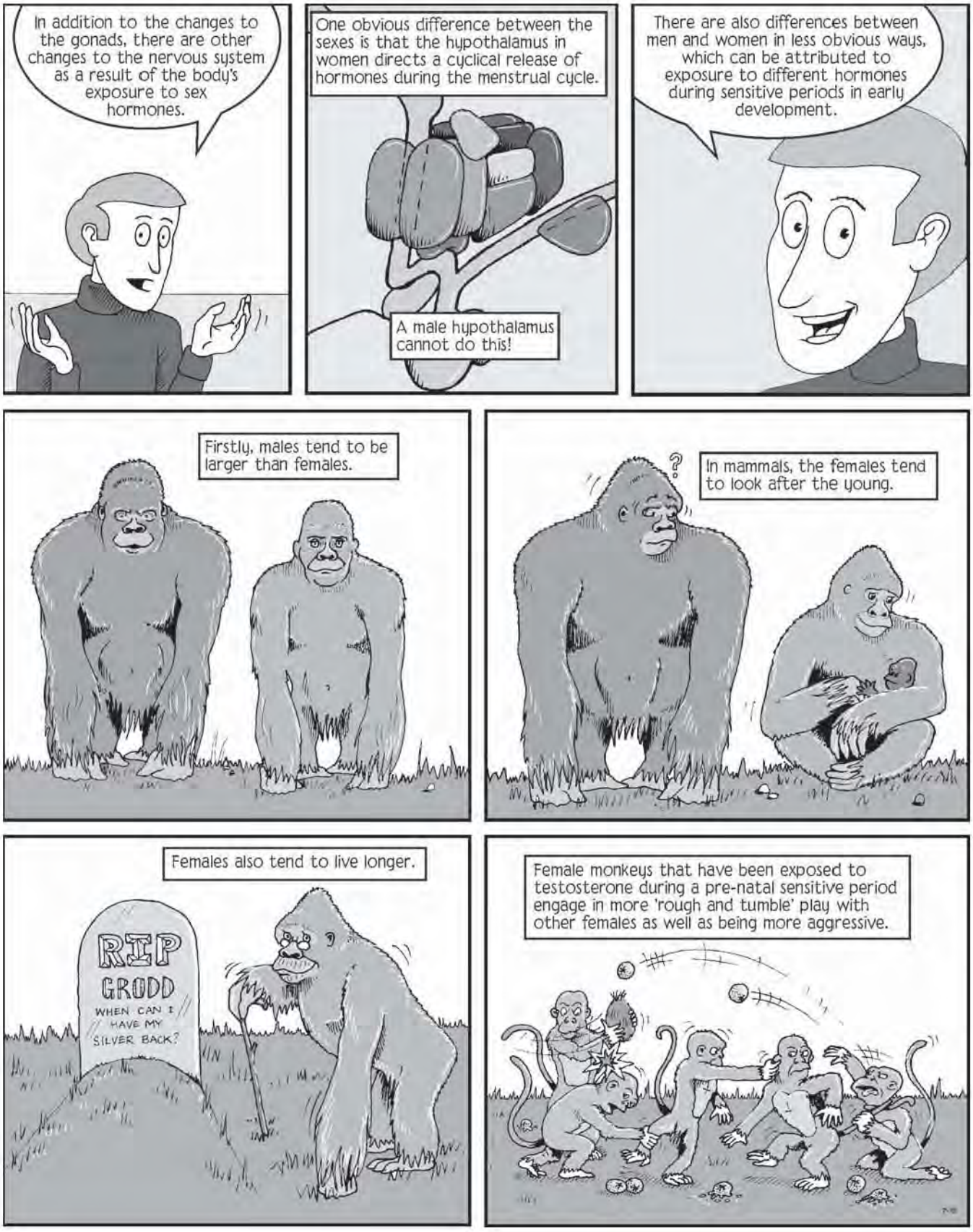

Emotions naturally leads us to the emotionally charged area of sexual behaviour.
But before I carry on, I'm afraid I've got a bit of a confession to make...
Well... uh... you know... the thing is... that this part of the chapter is not just about sexual behaviour.
It's really about hormones and their influence on behaviour.
Granted, most of the hormonal influence that is covered in this chapter involves a great deal of sexual behaviour!
But don't let this put you off. The influence of hormones on sex (and gender) is a fascinating and enthralling subject!
No REALLY - you should know to trust me by now.
This is also a good opportunity to discuss hormones in general.
However, I must warn you that there is some quite frank discussion from here on.
ADULTS ONLY
18
Suggested for Mature Readers
Yeah right! Like that's going to stop you reading more!


Hormones are chemicals that are secreted by a gland and sent by the bloodstream to the target.
Hormones control a large variety of human behaviour – especially sexual behaviour!
Hormones are produced by ENDOCRINE glands.
There are a number of major glands throughout the body.
PITUITARY AND PINEAL GLAND
HYPOTHALAMUS
THYROID
THYMUS
ADRENAL GLAND
LIVER
KIDNEY
PANCREAS
OVARIES AND PLACENTA (IN FEMALE)
TESTES (IN MALE)
The pituitary gland releases hormones that influence the other endocrine glands and is sometimes called the master endocrine gland.
PITUITARY GLAND
The pituitary gland is actually two glands – the anterior and the posterior pituitary gland.
Each part is responsible for the release of different hormones from the endocrine glands.
ANTERIOR PITUITARY GLAND
POSTERIOR PITUITARY GLAND

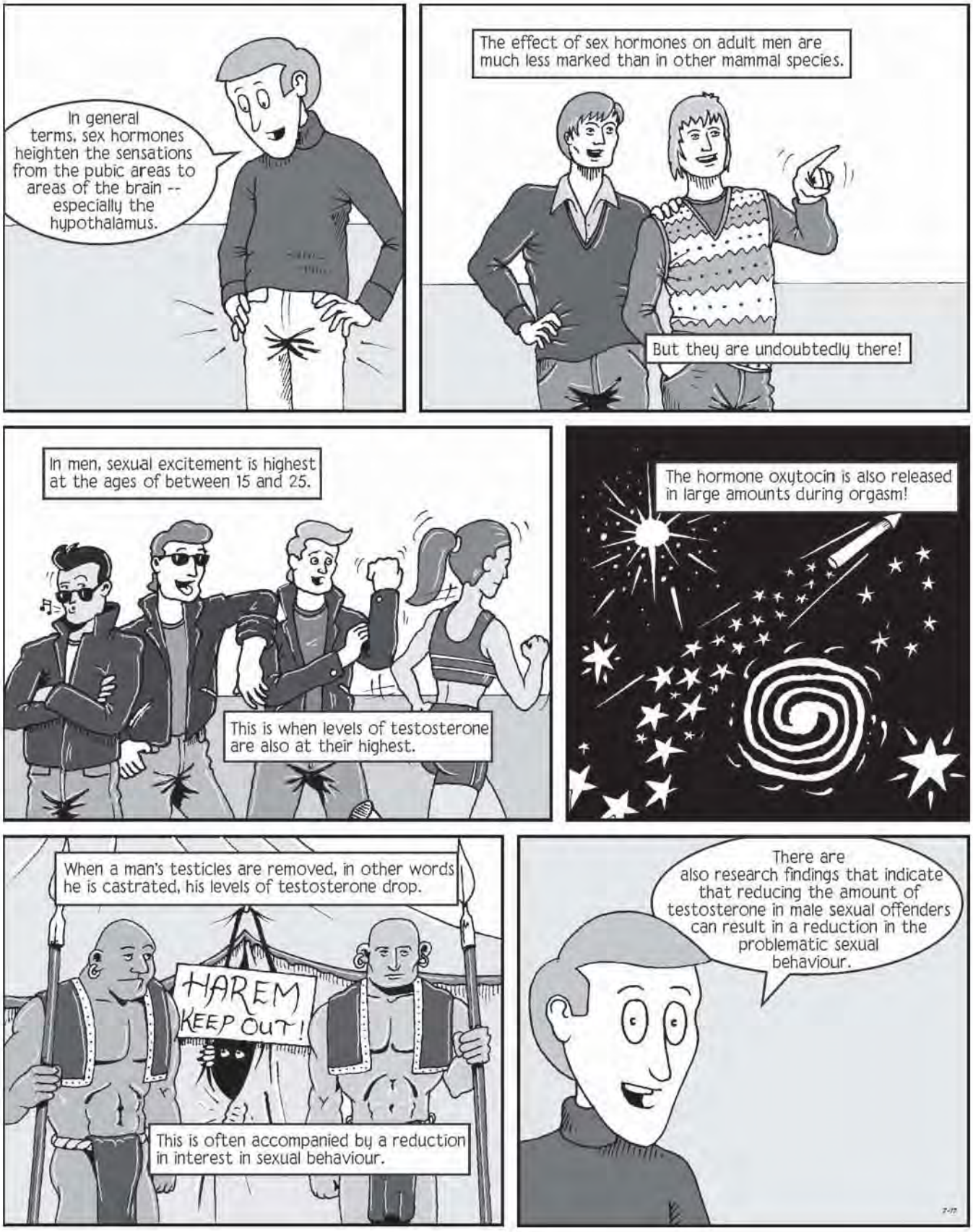

Hormones are similar to neurotransmitters.
In fact, Epeniphrine and Norapeniphrine are two chemicals that have both hormone AND neurotransmitter effects.
The difference between them is that neurotransmitters are chemicals released very close to the target cells whereas hormones are carried by the bloodstream to affect cells much further away from their release sites.
Hormones are also designed to affect a number of different organs and body parts to achieve one overall effect.
Hormones are divided into one of two types.
Protein hormones, like insulin, alter the metabolism of cells or allow certain substances to enter cells.
10ml
Insulin
Protein Hormone
Steroid hormones, like cortisol, determine the expression of genes in cells.

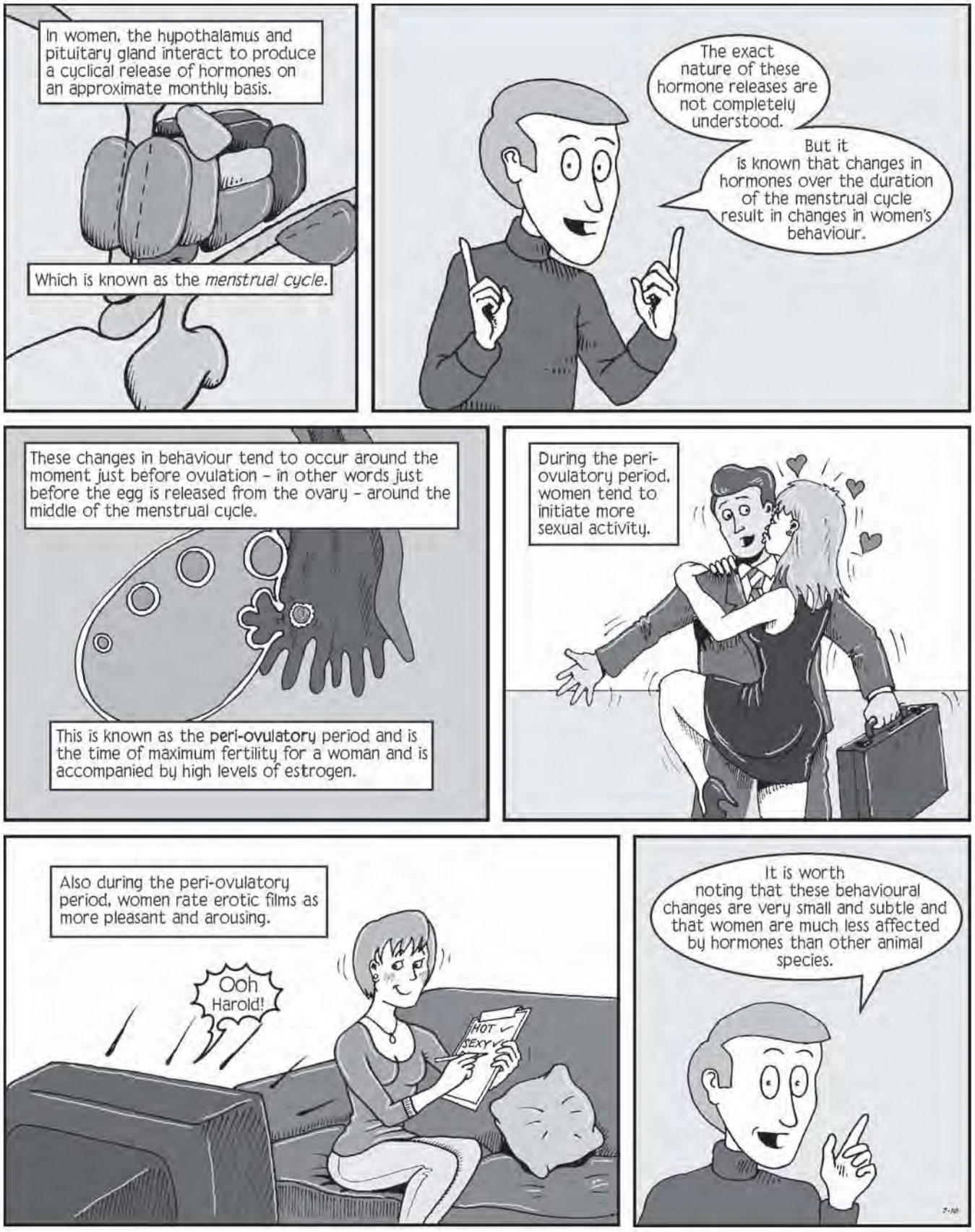

There is a third category of hormones:
SEX hormones!
Sex hormones like oestrogen and testosterone are actually steroid hormones that also work by expressing cells' genes.
Hormones have two effects.
ORGANISING effects that influence the development of the body from conception to sexual maturity.
ACTIVATING effects that influence adult behaviour for a short time.
OFF
ON
Normally, ANDROGENS, like testosterone, are referred to as male hormones.
OESTROGENS, like estradiol, are known as female hormones.
However, both types of hormone are found in both men AND women!
It is simply that androgens are found in men at ten times the levels found in women and oestrogens are found in women at ten times the levels found in men!

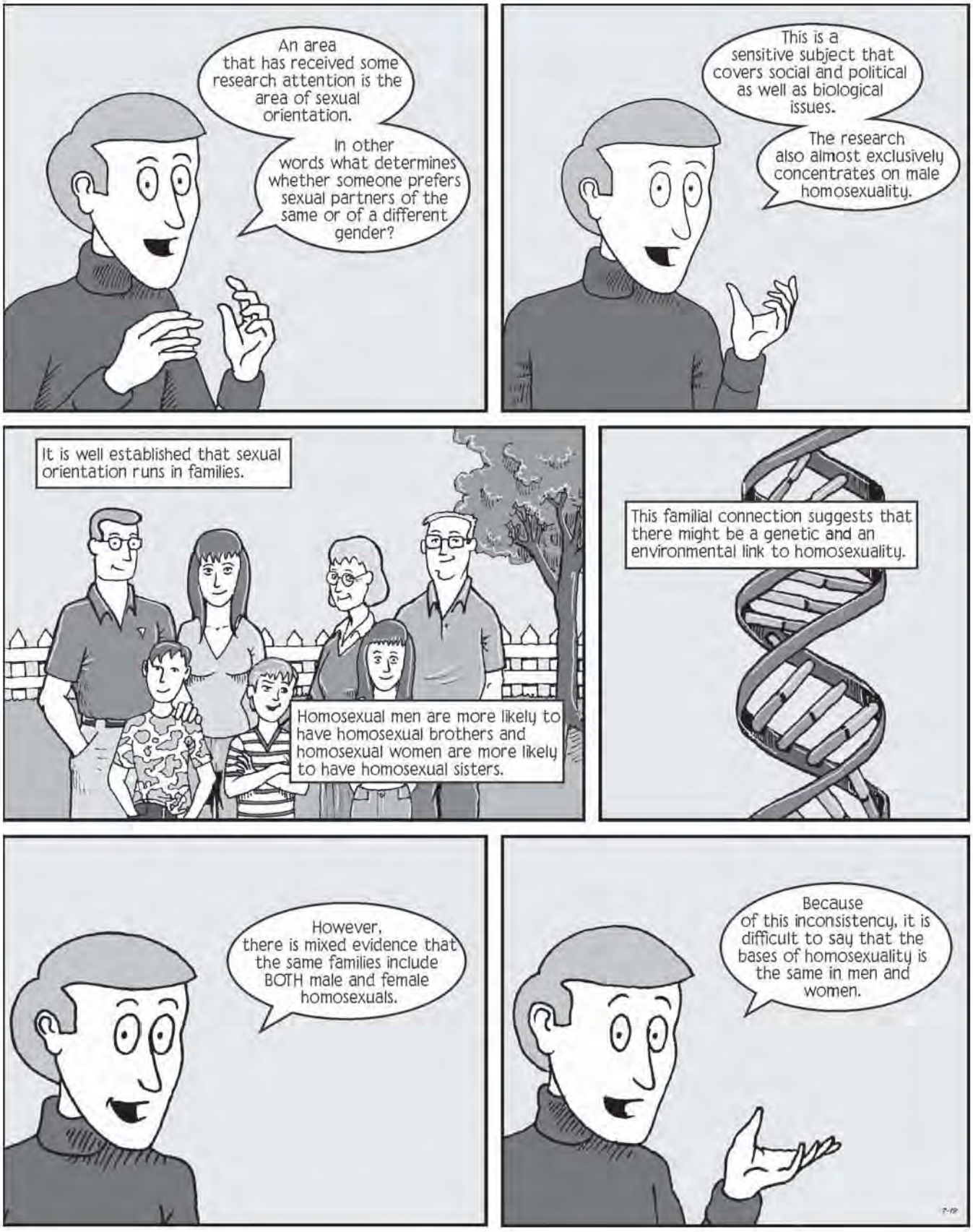

During early pre-natal development in mammals, the reproductive organs of a male and female foetus are identical.
Whether these structures become male or female depend on the influence of testosterone in early development.
A male foetus has a Y chromosome that causes the development of testes.
The primitive testes begin to produce testosterone which causes the testes to grow and produce more testosterone and so on.
Testosterone also causes the development of various structures into male reproductive organs.
A female foetus does not develop testes and therefore does not get influenced by testosterone.
The gonads develop into ovaries and other female reproductive organs.
It is true, however, that a female foetus exposed to sufficient testosterone at a particular moment of development would develop male sexual organs!
Changes in the foetus depend on the amount of testosterone it is exposed to during a SENSITIVE period in gestation.
This Year
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Oct
Nov
Dec
This is about the 3rd or 4th month of pregnancy in humans although it does vary in other mammas.

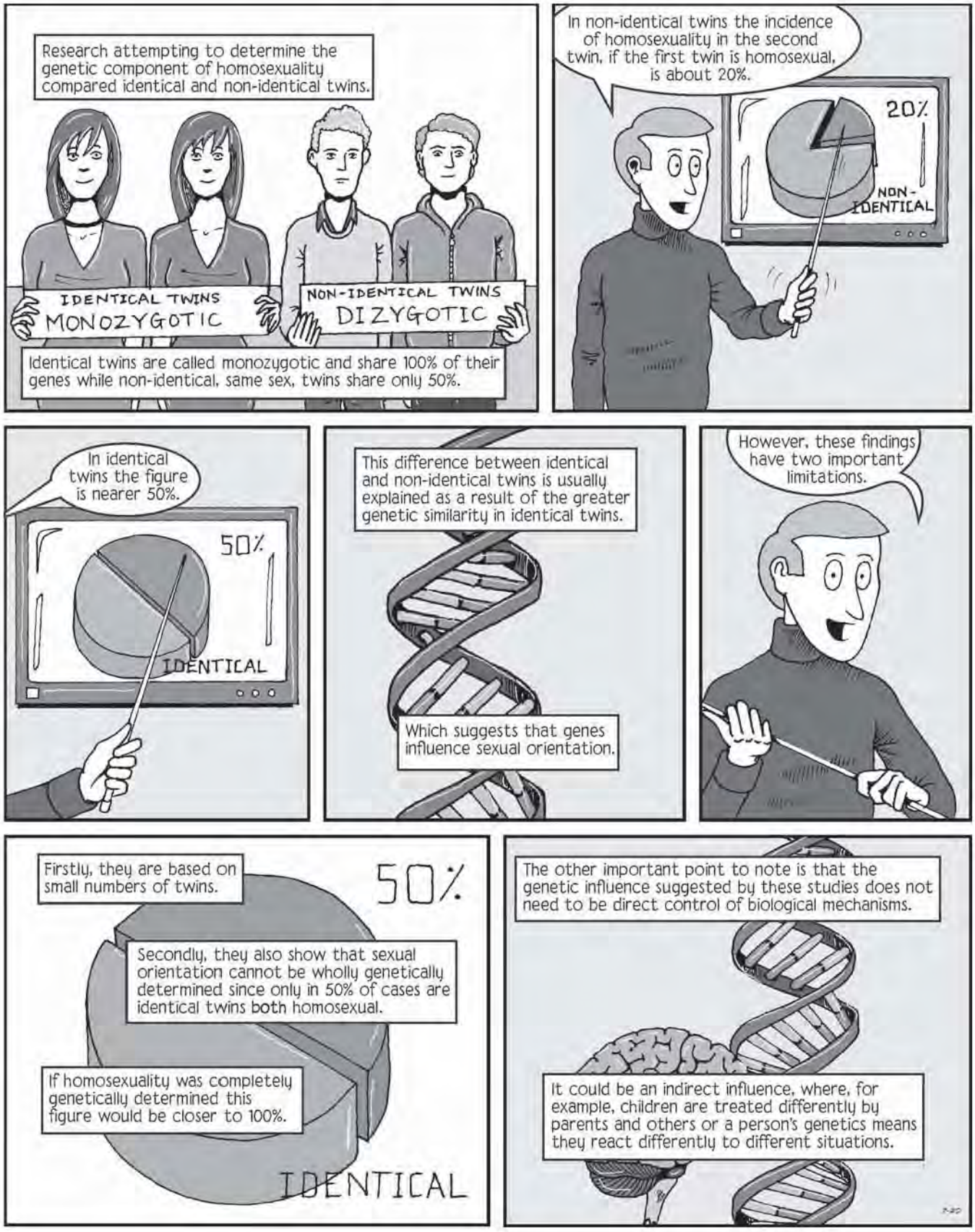

In addition to the changes to the gonads, there are other changes to the nervous system as a result of the body's exposure to sex hormones.
One obvious difference between the sexes is that the hypothalamus in women directs a cyclical release of hormones during the menstrual cycle.
A male hypothalamus cannot do this!
There are also differences between men and women in less obvious ways, which can be attributed to exposure to different hormones during sensitive periods in early development.
Firstly, males tend to be larger than females.
?
In mammals, the females tend to look after the young.
Females also tend to live longer.
RIP
GRODD
WHEN CAN I HAVE MY SILVER BACK?
Female monkeys that have been exposed to testosterone during a pre-natal sensitive period engage in more 'rough and tumble' play with other females as well as being more aggressive.

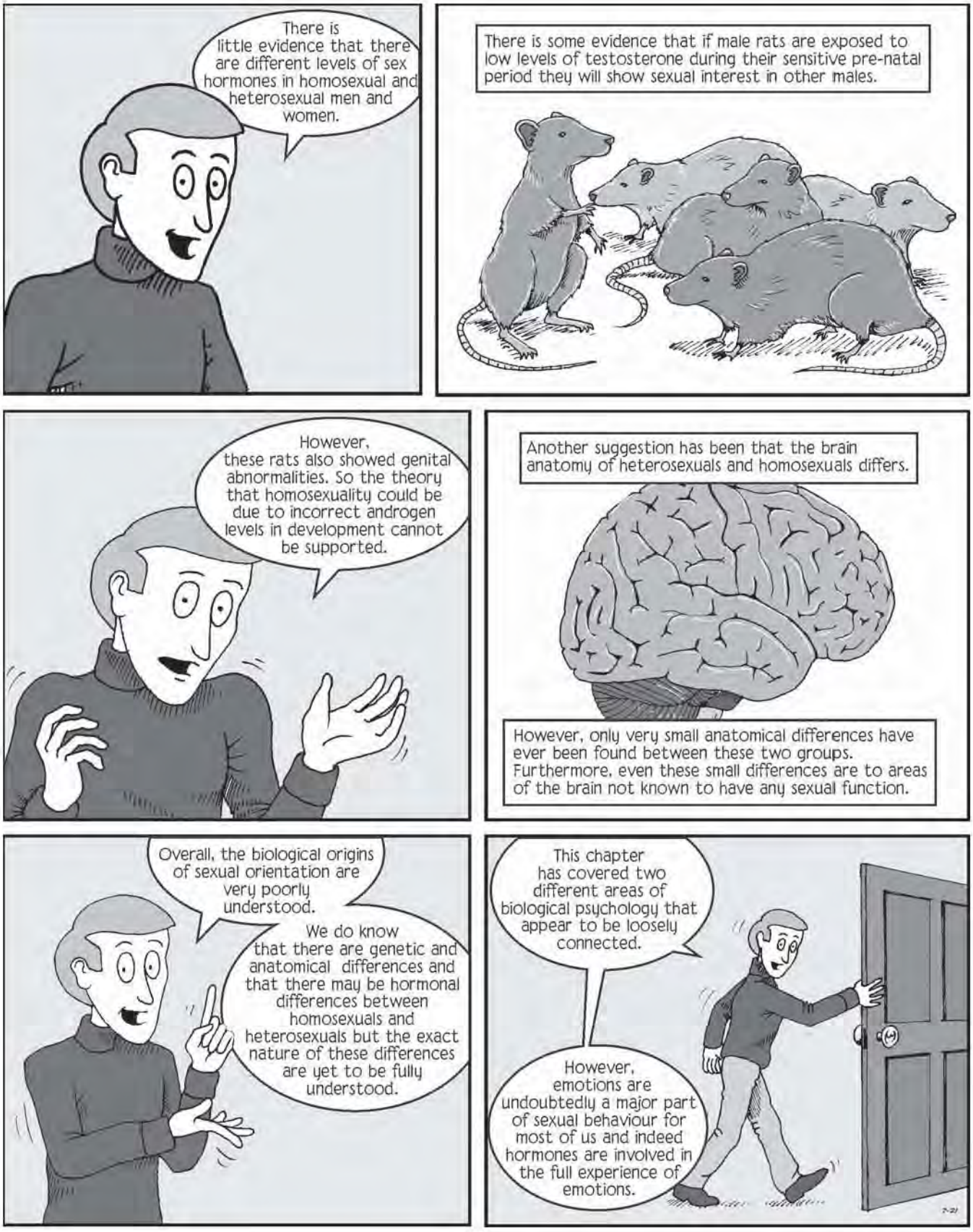

There is some research evidence to suggest that girls who are exposed to male hormones in pre-natal development will engage in more boy-like behaviour like playing with boy's toys.
Of course, this finding is controversial and somewhat difficult to uphold since the girls involved had genetic abnormalities and tended to look more masculine.
UNFAIR
BOO!
SEXIST
As mentioned earlier, hormones also have effects throughout life NOT just during a sensitive pre-natal period.
These are known as ACTIVATING effects.
If the testes of a male rat are removed, then its interest in sexual activity decreases.
Rat race continues
Daily Murine
Ratted!
If the rat is then injected with testosterone its sexual interest returns.
Ooh Harold!
Testosterone
gets you going
300ml
The same is true of female rats.
If their ovaries are removed, sexual behaviour decreases until female hormones are injected.
Certain behaviours can also trigger hormone release.
For example, dominance hierarchies in some monkey species causes the suppression of hormone release in the lower ranks.


In general terms, sex hormones heighten the sensations from the pubic areas to areas of the brain -- especially the hypothalamus.
The effect of sex hormones on adult men are much less marked than in other mammal species.
But they are undoubtedly there!
In men, sexual excitement is highest at the ages of between 15 and 25.
This is when levels of testosterone are also at their highest.
The hormone oxytocin is also released in large amounts during orgasm!
When a man's testicles are removed, in other words he is castrated, his levels of testosterone drop.
HAREM
KEEP OUT!
This is often accompanied by a reduction in interest in sexual behaviour.
There are also research findings that indicate that reducing the amount of testosterone in male sexual offenders can result in a reduction in the problematic sexual behaviour.


In women, the hypothalamus and pituitary gland interact to produce a cyclical release of hormones on an approximate monthly basis.
Which is known as the *menstrual cycle*.
The exact nature of these hormone releases are not completely understood.
But it is known that changes in hormones over the duration of the menstrual cycle result in changes in women's behaviour.
These changes in behaviour tend to occur around the moment just before ovulation – in other words just before the egg is released from the ovary – around the middle of the menstrual cycle.
This is known as the **peri-ovulatory** period and is the time of maximum fertility for a woman and is accompanied by high levels of estrogen.
During the peri-ovulatory period, women tend to initiate more sexual activity.
Also during the peri-ovulatory period, women rate erotic films as more pleasant and arousing.
Ooh Harold!
HOT ✓
SEXY ✓
It is worth noting that these behavioural changes are very small and subtle and that women are much less affected by hormones than other animal species.


An area that has received some research attention is the area of sexual orientation.
In other words what determines whether someone prefers sexual partners of the same or of a different gender?
This is a sensitive subject that covers social and political as well as biological issues.
The research also almost exclusively concentrates on male homosexuality.
It is well established that sexual orientation runs in families.
Homosexual men are more likely to have homosexual brothers and homosexual women are more likely to have homosexual sisters.
This familial connection suggests that there might be a genetic and an environmental link to homosexuality.
However, there is mixed evidence that the same families include BOTH male and female homosexuals.
Because of this inconsistency, it is difficult to say that the bases of homosexuality is the same in men and women.


Research attempting to determine the genetic component of homosexuality compared identical and non-identical twins.
IDENTICAL TWINS
MONOZYGOTIC
NON-IDENTICAL TWINS
DIZYGOTIC
Identical twins are called monozygotic and share 100% of their genes while non-identical, same sex, twins share only 50%.
In non-identical twins the incidence of homosexuality in the second twin, if the first twin is homosexual, is about 20%.
20%
NON-IDENTICAL
In identical twins the figure is nearer 50%.
50%
IDENTICAL
This difference between identical and non-identical twins is usually explained as a result of the greater genetic similarity in identical twins.
Which suggests that genes influence sexual orientation.
However, these findings have two important limitations.
Firstly, they are based on small numbers of twins.
50%
Secondly, they also show that sexual orientation cannot be wholly genetically determined since only in 50% of cases are identical twins both homosexual.
If homosexuality was completely genetically determined this figure would be closer to 100%.
IDENTICAL
The other important point to note is that the genetic influence suggested by these studies does not need to be direct control of biological mechanisms.
It could be an indirect influence, where, for example, children are treated differently by parents and others or a person's genetics means they react differently to different situations.


There is little evidence that there are different levels of sex hormones in homosexual and heterosexual men and women.
There is some evidence that if male rats are exposed to low levels of testosterone during their sensitive pre-natal period they will show sexual interest in other males.
However, these rats also showed genital abnormalities. So the theory that homosexuality could be due to incorrect androgen levels in development cannot be supported.
Another suggestion has been that the brain anatomy of heterosexuals and homosexuals differs.
However, only very small anatomical differences have ever been found between these two groups. Furthermore, even these small differences are to areas of the brain not known to have any sexual function.
Overall, the biological origins of sexual orientation are very poorly understood.
We do know that there are genetic and anatomical differences and that there may be hormonal differences between homosexuals and heterosexuals but the exact nature of these differences are yet to be fully understood.
This chapter has covered two different areas of biological psychology that appear to be loosely connected.
However, emotions are undoubtedly a major part of sexual behaviour for most of us and indeed hormones are involved in the full experience of emotions.